

REMARKS

Claims 1-37, 39-40, 42-47, 49-54, 56, 58-68 and 70 are still pending in the present application.

I. THE OBVIOUSNESS REJECTION

In paragraphs 2-3 of the Office Action, claims 1-6, 8-9, 11-12, 15, 32-34, 36, 43-45, 47, 58-62, 64, 66-68, 71 and 72 are rejected as being obvious based on a proposed combination of Li (U.S. Patent 5,841,918) in view of Feced et al. (U.S. Patent 6,445,852).

Claim 1

The obviousness rejection is respectfully traversed because neither Li, Feced et al. nor the proposed combination thereof teaches or suggests an optical filter featuring first and second optical elements having respective first and second reflective filter functions, wherein at least one of the first and second reflective filter functions is not substantially flat over a substantial portion of the respective first or second reflective filter functions, as recited in amended claim 1.

One important advantage of this claimed optical filter is that it can tune an optical input signal and produce an optical output signal that is not substantially flat over a substantial portion thereof. In effect, the tuning can result in the optical output signal having a desired effective filter function that is

very difficult or substantially impossible to produce by a single grating, as described in the patent application on page 9, lines 23-25. For example, Figures 5-7 show respective filter profiles for the first and second reflective filter functions, as well as output filter functions that would be very difficult or substantially impossible to produce by a single grating. In particular, Figures 5-7 show examples of combining Guassian and ramp amplitude profiles to provide a desired signal having a combined Guassian/ramp grating amplitude profile in Figure 5, or combining a Guassian and rectangular amplitude profiles to provide a desired signal having a combined Guassian/rectangular amplitude profile in Figures 6-7. The desired Guassian/ramp and Guassian/rectangular amplitude profiles have different amplitude profiles than either filter function profile of the two gratings used to provide the same. It is respectfully submitted that a person skilled in the art would appreciate that the combined Guassian/ramp and Guassian/rectangular amplitude profiles would be very difficult or substantially impossible to produce by a single grating.

Further, there is a need in the state of the art for an optical filter that can tune and/or condition an optical input signal into an optical output signal having such a desired effective filter function that is not substantially flat over a substantial portion thereof, and the claimed optical filter fills that need. For all these reasons, the claimed optical filter

provides an important contribution to the overall state of the art.

In contrast to the claimed invention, Li discloses an optical system having a tuning element 18 with a reflection profile shown in Figure 2a, and a tuning element 20 with a transmission profile shown in Figure 2b, each having a respective amplitude profile. The combined reflection and transmission profiles result in a desired optical signal having a filter function shown in Figure 2c. In effect, Li's optical filter merely has two substantially flat filter functions, for providing an output signal having a corresponding substantially flat filter function. In operation, Li's filter can only tune or condition the optical input signal in relation to its bandwidth and/or wavelength using such substantially flat filter functions. Consistent with that shown in Figure 3, Li's optical system may be used as a demultiplexer receiving channels on waveguide 10 and passing or blocking the same to output 1, output 2, output 3 or output 4.

Moreover, Li does not hint or suggest to use at least one of the first and second reflective filter functions that is not substantially flat over a substantial portion of the first or second reflective filter functions, as recited in claim 1, especially in order to produce an optical output signal that is not substantially flat over a substantial portion thereof, which is the whole thrust of the claimed invention. Moreover still,

nothing in Li suggests a reason to look beyond the teaching of Li itself as a whole to produce an optical output signal that is not substantially flat over a substantial portion thereof. For example, there is clearly no reason or motivation to use anything other than a flat filter function in the optical systems disclosed by Li.

The reasoning in paragraph 3 of the Office Action recognizes the deficiency in the teaching of Li and points to Feced et al. to make up for this deficiency. However, while Feced et al. discloses an optical filter having a filter function that is not substantially flat over a substantial portion thereof, it is respectfully submitted that one of ordinary skill in the art would not be motivated to combine Feced et al.' "not substantially flat" filter with one of Li's "substantially flat" filter in the manner proposed in the paragraph bridging pages 6-7 of the Office Action. For example, nothing in Feced et al. suggests a reason to modify the teaching of Li as a whole to produce an optical output signal that is not substantially flat over a substantial portion thereof. Moreover, it is respectfully submitted that neither Li nor Feced et al. suggest a need or desire "to provide for filter characteristics that are well-matched to ideal filter responses for a wide variety of applications," as stated in the reasoning on page 7, lines 9-10, of the Office Action, which appears to be the whole basis for making the proposed combination of these cited prior art

references.

For all these reasons, it is respectfully submitted that the proposed combination of Li in view of Feced et al. does not teach or suggest the claimed invention.

Dependent claims 2-6, 8-9, 11-12, 15 depend directly or indirectly from claim 1, contain all the limitations therein, and are deemed patentable for the reasons discussed above.

Claims 32 - 34 and 36

Independent claim 32 recites a method for filtering an optical signal having similar limitations as claim 1. For reasons similar to that discussed above in relation to claims 1, it is respectfully submitted that independent claim 32 is deemed patentable over that disclosed in the proposed combination of Li in view of Feced et al..

Dependent claims 33-34 and 36 depend directly or indirectly from claim 32, contain all the limitations therein, and are deemed patentable for the reasons discussed above.

Claims 71-72

Independent claims 71-72 recites optical filters having similar limitations as claim 1. For reasons similar to that discussed above in relation to claims 1, it is respectfully submitted that independent claims 71 and 72 are deemed patentable over that disclosed in the proposed combination of Li in view of

Feced et al..

Claims 58 - 62, 64, and 66-68

Independent claim 58 recites an optical filter having a first reflective element for reflecting a first wavelength band of light centered at a first reflection wavelength, and a second reflective element for reflecting a second wavelength band of the light centered at a second reflection wavelength, whereby the first reflection wavelength and the second reflection wavelength are substantially the same. Figures 3A, 3B, 3C and 6 show the filter function profiles for this embodiment.

Consistent with that discussed above, it is respectfully submitted that neither Li, Feced et al. nor the proposed combination thereof teaches or suggests an optical filter having first and second reflection wavelengths that are substantially the same, as recited in claim 58. For example, Li clearly does not use first and second reflection wavelengths that are substantially the same, while nothing in Feced et al. hints or suggests using two reflection wavelengths that are substantially the same, as recited in claim 58. Moreover, if Li's first and second reflection wavelengths were substantially the same, then there would be no tuning of the bandwidth, which is the whole purpose of the design of Li's optical system. In view of this, it is respectfully submitted that Li effectively teaches away from the optical filter recited in claim 58, in such a way that

there is no reason or motivation to look beyond the teaching of Li itself as a whole or to make such a modification. For all these reasons, it is respectfully submitted that the proposed combination of Li in view of Feced et al. does not teach or suggest the claimed invention.

Moreover, dependent claims 59-62, 64, and 66-68 depend directly or indirectly from claim 58, contain all the limitations therein, and are deemed patentable for the reasons discussed above.

The Remaining Dependent Claims

In paragraphs 4-5 of the Office Action, these remaining claims 7, 13-14, 16-19, 37, 46, 49-51, 53-54, 56 and 65 are rejected based on proposed combinations of Li in view of Feced et al. and/or Fernald et al. (U.S. Patent No. 6,229,827).

The remaining claims depend directly or indirectly from the aforementioned independent claims or one of the aforementioned dependent claims and contains all the limitations therein.

It is respectfully submitted that the one or more other cited references do not make up for the deficiency in that disclosed in Li in relation to that discussed above.

For these reasons, it is respectfully that the these remaining claims are patentable over the cited prior art.

II. THE OBVIOUSNESS REJECTION

In paragraph 7 of the Office Action, independent claim 22 and remaining dependent claims 23-28, 30 and 70 are rejected under 35 U.S.C. 103 as being obvious over Li in view of Fernald et al..

Claim 22 recites a tunable optical filter having a tunable optical waveguide for tuning light using a dual inner core. The first inner core has a first reflective element disposed therein, the first reflective element receiving the light and reflecting a first wavelength band of the light centered at a first reflection wavelength, the first reflective element being characterized by a first reflective filter function. The second inner core has a second reflective element disposed therein, the second inner core being optically connected to the first inner core to receive the reflected first wavelength band of the light, the second reflective element reflecting a second wavelength band of the light centered at a second reflection wavelength, the second reflective element being characterized by a second reflective filter function. This dual core embodiment is shown in Figure 15 and described on pages 20-21. One advantage of the claimed tunable optical filter is that the dual cores can be simultaneously tuned for performing the tunable optical filter functionality.

It is respectfully submitted that Li does not even remotely suggest using a waveguide having dual cores that are optically

connected to perform optical filtering on an optical input signal. Foremost, Li's two filter functions are not arranged in a dual core waveguide, and nothing in Li suggests a need, desire or reason for doing the same.

Moreover, it is respectfully submitted that in order for Li to work as a multiplexer, its reflective and transmissive elements must be separately tuned; and if simultaneously tuned like a dual core embodiment is likely to be, then Li's device is not likely to selectively filter the required wavelength band in order to function as a multiplexer. This is a reason why a person skilled in the art would not be motivated to look beyond the teaching of Li as a whole or look to modify the same in the manner proposed in paragraph 7 of the Office Action.

In addition, consistent with that discussed above in relation to claim 58, if Li's first and second reflection wavelengths were to be arranged in a dual core, then there is likely to be no tuning of the bandwidth since the distance between the center wavelengths is not likely to change. In view of this, it is respectfully submitted that Li effectively teaches away from the optical filter recited in claim 22. This is another reason why a person skilled in the art would not be motivated to look beyond the teaching of Li as a whole or look to modify the same in the manner proposed in paragraph 7 of the Office Action.

Further, Fernald et al. does not make up for this

deficiency. For example, while Fernald et al. discloses a waveguide having a dual core in Figures 9-11, it is respectfully submitted that Fernald et al. does not teach or suggests optically connecting its dual cores in its waveguide and using them to perform optical filtering on an optical input signal in a system such as Li's.

The remaining claims 23-28, 30 and 70 depend directly or indirectly from independent claims 22 and contains all the limitations therein. The remaining claims are patentable over Li in view of Fernald et al. for all the reasons discussed above. Moreover, it is respectfully submitted that Li teaches away from aligning first and second reflection wavelengths to reflect a portion of the aligned wavelength bands to a output port.

III. CONCLUSION

Reconsideration and early allowance of the claims is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "William J. Barber". The signature is fluid and cursive, with a long horizontal stroke at the end.

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